

NEW SPECIES OF CLEARWING MOTHS (LEPIDOPTERA: SESIIDAE)
FROM NORTH AMERICA

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ABSTRACT—Five new species of Clearwing moths from North America are described: *Melittia calabaza*, *Synanthedon arkansasensis*, *S. canadensis*, *S. dominicki*, and *Carmenta engelhardtii*. Relationships with previously described species are discussed and distribution patterns are presented.

During the course of revisionary studies currently being conducted by the authors on the Western Hemisphere Sesiidae (= Aegeriidae), a number of new species have been discovered from North America. In addition to the revisionary studies, a fascicle on the family is being prepared by the authors for publication in *The Moths of America North of Mexico*. In order to treat the new species from North America without making major alterations in format and to allow full discussion, when necessary, of relationships with species that occur outside the scope of the North American fascicle, the present paper was prepared.

Although the North American sesiids have been the subject of 2 previous monographs, Beutenmüller (1901) and Engelhardt (1946), the fauna is still imperfectly known, as evidenced by the new species herein described. Even more troublesome, the paucity of distribution records for many species seriously restricts our knowledge of species' ranges and extent of variation in populations throughout the range. It is the authors' hope that this publication and others planned for the immediate future will stimulate interest on the part of collectors to assist in improving our knowledge of this unique family.

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Genus *Melittia* Hübner

Melittia calabaza n. sp.

figs. 3a, 6; Map 1

Male: Antenna not pectinate but strongly ciliate ventrally, olive-green, dorsally weakly powdered white or pale yellow on apical $\frac{1}{3}$. Proboscis well developed. Labial palpus roughened, orange, white on basal segment and mixed ventrally on second segment, often with line of black setaceous scales subventrally. Head with vertex olive-green with specialized, setaceous scales (chaetosema) posteriorly and medially; flat olive-green scales projecting shelllike from beneath antennae, extending over middle of eyes; front white, often with gray dorsomesad; occipital fringe setaceous, brown-black mixed with white, eyes margined with white scales. Thorax olive-green with lateral tufts of long, setaceous, pale yellow or white scales posteriorly, often projecting ventrally as well as posteriorly. Forewing olive-green, opaque but for narrow hyaline streak at base below vein *Cu* and another shorter hyaline streak in cell; costal edge pale orange; fringe fuscous, tipped with white; wing ventrally with some pale yellow basally. Hindwing hyaline except for very narrow band of brown-black on margins, brown-black on veins, often some white on anal margin basally. Legs with coxae of prothoracic legs orange, some white basally; femora of all legs orange at least dorso-apically, often brown-black ventrobasally; tibiae of mesothoracic legs orange with white on basal half; metathoracic legs with tibiae very strongly tufted with erect, brown-black scales dorsomesally, orange-red dorsally and dorsolaterally, some white dorsomedially; spurs brown-black with white tufting on posterior margin on both lateral spurs; first tarsal segment tufted similar to tibiae, but with less orange-red; all remaining tarsi alternately ringed with brown-black and white. Abdomen dorsally olive-green; segment 2 orange, with orange medially at least on segments 3-7, usually with black spot medially on anterior $\frac{1}{2}$ of segments 2-6 and sometimes 7; abdomen ventrally orange with some white; anal tuft weakly defined, rounded, mostly orange with some black mixed. Male genitalia as in figure 3a. Inner margin of apical processes of uncus relatively sharply angled. On valva, saccular ridge narrows abruptly toward apex, broadened and somewhat excavated on basal $\frac{1}{2}$ ventrad. Saccus elongate, slender and bulbous at apex. Wing length of male, 13-15 mm.

Female: Maculation essentially the same as for the male with the following exceptions: most olive-green coloration somewhat darker; small black scale tuft present on labial palpus of male is lacking on female; abdomen mostly orange except for dark olive-green on first segment and variously olive-green on segments 3-4, black spot dorsomedially on all segments except first; only 1 hyaline streak on forewing. Female genitalia as in figure 6. Wing length of female, 12-15 mm.

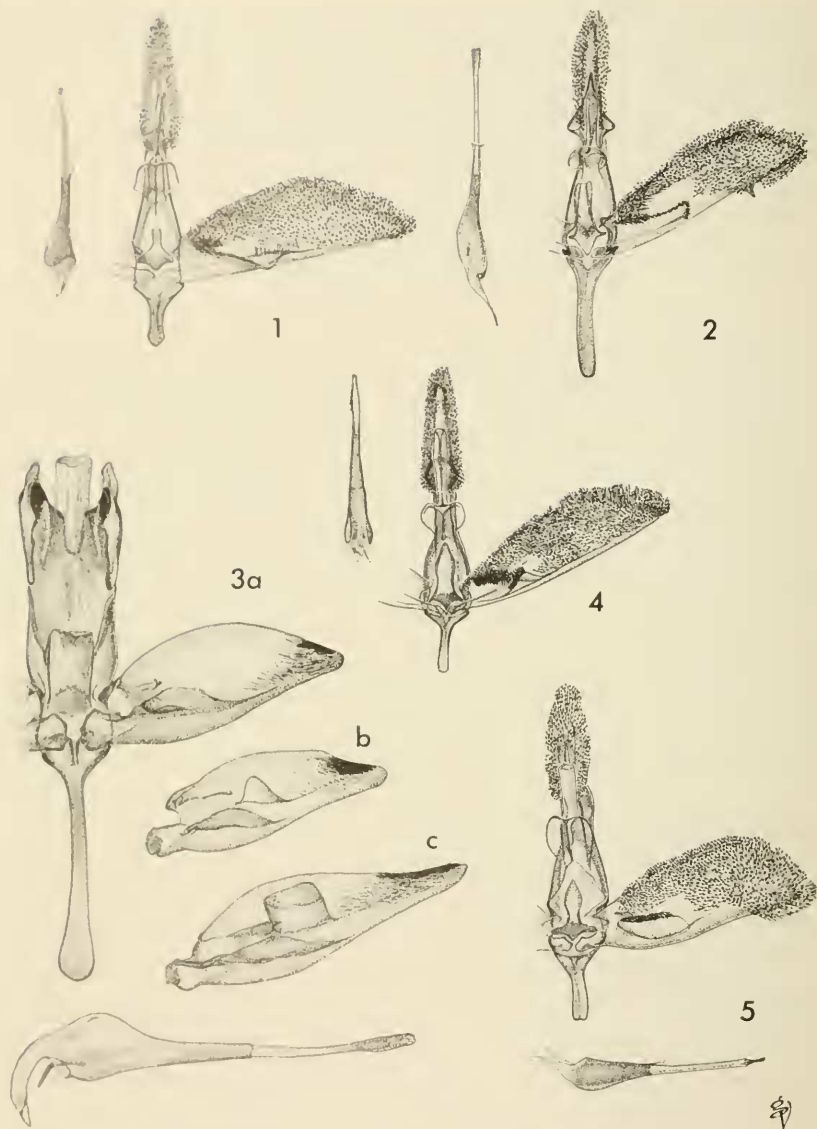
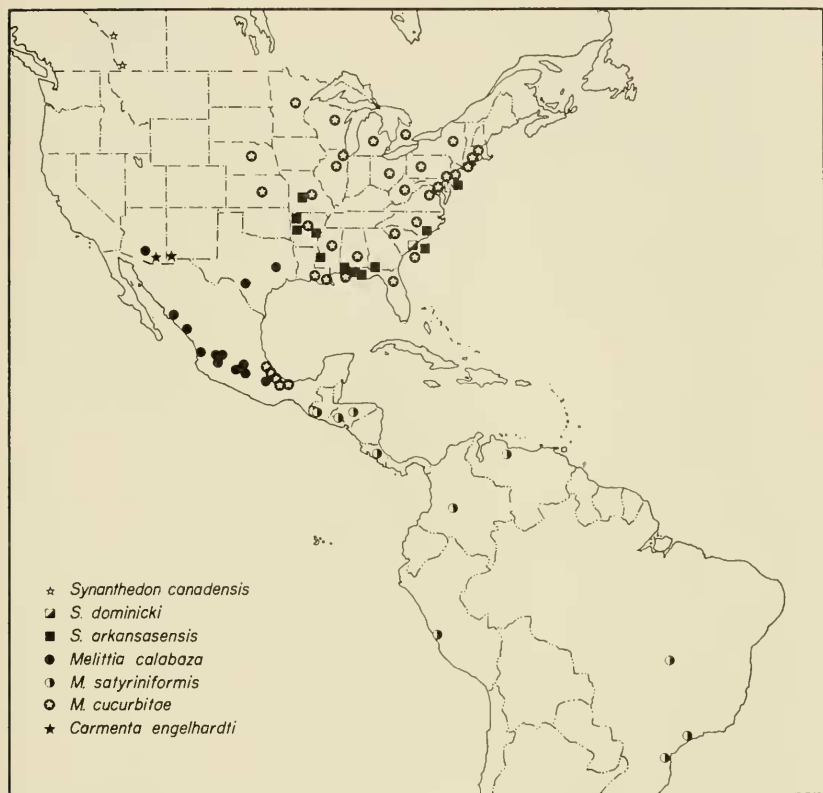


Fig. 1-5. Male genitalia: 1, *Synanthedon dominicki*; 2, *Carmentis engelhardti*; 3a, *Melittia calabaza*; 3b, *M. cucurbitae* (right valva); 3c, *M. satyriniformis* (right valva); 4, *Synanthedon arkansasensis*; 5, *S. canadensis*.



Map 1. Distribution of sesiid species.

Host: Species of Cucurbitaceae. No specific records could be found regarding host species, but a few specimens of the moth were labeled as having been reared from calabaza, the Spanish vernacular for a number of cucurbitaceous plants.

Distribution (map 1): Present records are from Texas and Arizona, southward into Mexico in the Sierra Madre Occidental, then eastward across central Mexico as far as Orizaba in the State of Veracruz.

Types: Holotype: ♂, Mexico: Mex., Teotihuacan, July 1, 1965, O. S. Flint, (USNM No. 72384). Four paratypes: 1 ♂, College Station, Tex., 9-11-19, T.D.E. slide no. 76063; 1 ♀, Tucson (Ariz.), 8-20-25, H. F. Tate collector; 2 ♀, Los Reyes, Mex., VII-1957, larva entre tallo de calabaza, larvae col. VII-1957, pupacion VIII-'57, emerg. de al VI-'58, Wm. W. Gibson collector; all deposited in the USNM. One paratype: ♂, Tucson, Pima Co., Arizona, Aug. 8 · 43, R. L. Chermock

Collection, deposited in the Cornell University Collection, Ithaca, New York.

Discussion: This species is very similar to *Melittia cucurbitae* (Harris) and *Melittia satyriniformis* Hübner and together with them forms a complex of apparently closely related species associated with plants of the genus *Cucurbita* and related genera in the Cucurbitaceae. Superficially, *M. calabaza* is readily distinguished by having the second abdominal segment orange dorsally rather than olive-green as is the case in the other 2 species. The males of *M. satyriniformis* are additionally distinguishable from *M. calabaza* by having the abdomen entirely olive-green dorsally, and by possessing a small hyaline streak on the apical area of the forewing that is not present in the other 2 species.

The male genitalia of *M. calabaza* differ from the other 2 species in the complex in the following characters (compare figs. 3a, b, c): the inner margins of the apical uncal processes are sharply angled relative to the other species; the saccus is narrow for most of its length, bulbous at the apex, but thicker in the other species and only slightly expanded apically; *M. calabaza* lacks the additional expanded process in the center of the valva dorsad of the saccular ridge, a character present on *M. cucurbitae* (rounded) and *M. satyriniformis* (quadrate) and useful in separating the latter two species; the saccular ridge is abruptly narrowed toward its apex in the other 2 species; the saccular ridge is widened and variously concave ventrad on its basal $\frac{1}{2}$, though only slightly widened and depressed on *M. cucurbitae* and essentially unwidened on *M. satyriniformis*.

The known distributions of the 3 species, *M. calabaza*, *M. cucurbitae*, *M. satyriniformis*, are indicated in Map 1. The current distribution patterns suggest that the species involved in this complex may be sympatric in certain portions of their ranges. This cannot be demonstrated until additional material can be examined from such critical zones as Texas, the eastern coastal and inland areas and the southern half of Mexico, assuming the ecological requirements of each species do not prevent their occurring in the same localities. The range of variation of the differentiating characters has not been observed to overlap from species to species, based on the examination of long series of each species from an area covering most of the Americas.

Genus *Synanthedon* Hübner
Synanthedon arkansasensis n. sp.
figs. 4, 8; map 1

Male: Antenna blue-black, clavate, tufted with scales apically, ciliate ventrally, ventral side of scape yellow. Proboscis well developed. Labial palpus pale yellow and smoothly scaled ventrally. Head with vertex blue-black, front mostly blue-

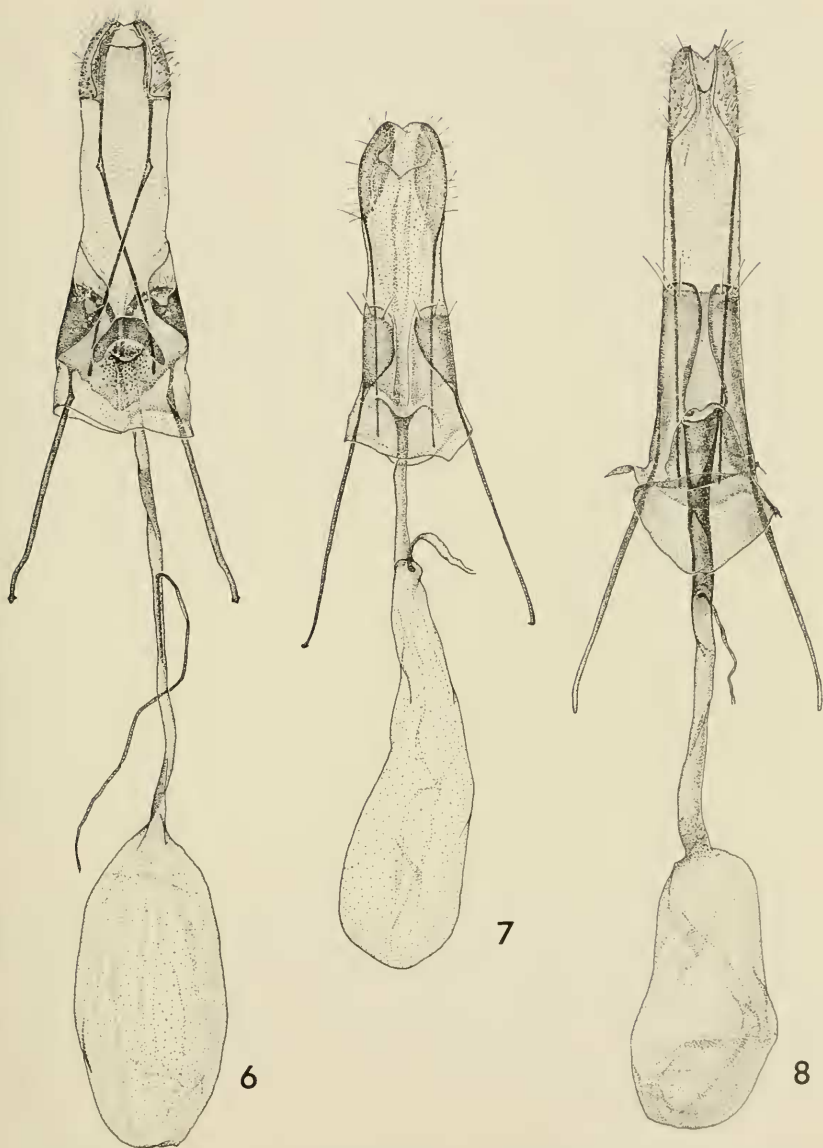


Fig. 6-8. Female genitalia: 6, *Melittia calabaza*; 7, *Carmenta engelhardti*; 8, *Synanthedon arkansasensis*.

black with white laterally, some pale yellow dorsolaterally beneath scape, occipital fringe yellow. Thorax blue-black dorsally with 2 subdorsal, longitudinal yellow bands, a transverse yellow band on posterior margin; mostly yellow ventrally. Forewing approximately $\frac{2}{3}$ hyaline, dorsally with costal and anal margins, discal spot, veins and fringe brown-black, with orange or yellow-orange on wing apex between veins and often outlining discal spot. Forewing ventrally powdered with orange or yellow-orange on veins and in apical region between veins. Hindwing hyaline except for brown-black on veins and fringe with some orange powdered on costal margin. Prothoracic leg laterally with coxa mostly yellow with blue-black on mesal margin, femur blue-black, tibia and tarsi yellow, mesally all legs mostly yellow. Mesothoracic leg with coxa and femur blue-black, tibia yellow with blue-black at spurs, and tarsi yellow ventrally, blue-black dorsally. Metathoracic leg with coxa and femur blue-black, tibia blue-black dorsolaterally, yellow ventrally and at spurs, tarsi blue-black dorsally, yellow ventrally and in ring around distal end of first and fifth segments. Abdomen and anal tuft mostly blue-black, dorsally all segments except first edged posteriorly with yellow; ventrally all segments except third may be edged posteriorly with yellow, yellow on edge of anal tuft laterally and on apices of valvi. Male genitalia as in figure 4. The genitalia are typical of the species included by Engelhardt (1946) in the genus *Ramosia*, having the saccular ridge of the valva with a ventrally projecting area covered with dark scales, beyond which the saccular ridge is naked to the apex. The medioventral plate of gnathos wide but relatively short. The aedeagus with small spines apically, minute cornuti on vesica. Wing length of male, 7-9 mm.

Female: Antenna as for male but lacking ventral cilia. Maculation as for male except forewing powdered orange on veins basad of discal cell; hindwing powdered orange along costal margin and wing fringe; abdominal bands of yellow wider than on male; anal tuft mostly yellow with blue-black laterally and medially. Female genitalia as in figure 8. Ductus bursae elongate, slender and sclerotized on posterior $\frac{1}{3}$ to $\frac{1}{2}$. Ductus seminalis arises from sclerotized portion of ductus bursae slightly posterior to membranous portion. Wing length of female, 7-10 mm.

Host: Unknown.

Distribution (map 1): Present records are from Missouri, Arkansas, Mississippi, Alabama, panhandle region of Florida, Georgia, coastal North and South Carolina, and New Jersey.

Types: Holotype, ♂, Devil's Den St. Pk., Washington Co., Arkansas, 17-VII-1966, R. W. Hodges, (USNM No. 72382). Fourteen paratypes with same locality and collector as holotype; 1 ♀, 8-VI-1966, 1 ♂, 3-VII-1966, 1 ♀, 5-VII-1966, 1 ♂ 2 ♀, 7-VII-1966, 2 ♂ 1 ♀, 9-VII-1966, and 1 ♂, 13-VII-1966; all deposited in the USNM. Paratypes: 1 ♂, 4-VI-1966, 1 ♂ 1 ♀, 6-VII-1966, and 1 ♀, 9-VII-1966 are deposited in the collection of the University of Arkansas, Fayetteville. One ♂ paratype: Wrangle Brook Rd., Lakehurst, N. J., 25 July, 1955, J. G. Franclemont, is deposited in the collection of Dr. J. G. Franclemont, Ithaca, New York.

Discussion: Most, if not all, of the specimens of this species studied

were collected at light. Although sesiids are generally considered to be diurnal or crepuscular in adult activity periods, the consistency with which a few species, including *S. arkansasensis*, are captured at lights suggests that they may be primarily nocturnal in habits.

Synanthedon canadensis n. sp.

fig. 5; map 1

Male: Antenna dorsally powdered pale yellow for entire length, clavate, ciliate ventrally, with scale tuft apically. Proboscis well developed. Labial palpus roughened ventrally, brown-black dorsally and laterally, yellow-orange ventrally and mesally. Head with vertex blue-black, front blue-black with white laterally, occipital fringe dorsally black mixed with yellow or yellow-orange, dorsolaterally yellow or yellow-orange becoming white ventrolaterally. Thorax dorsally blue-black apparently without lighter scaling, ventrolaterally with orange spot anterior on mesothorax and pale yellow posterior to spot. Wings mostly hyaline with blue-black on veins. Forewing dorsally with apical area dull orange between veins, discal spot and costal margin blue-black; ventrally with apical area, costal margin and fringe powdered dull orange. Hindwing ventrally with costal margin and fringe powdered dull orange. Prothoracic leg with coxa mostly white, tinted pale yellow ventrad, femur and tibia pale yellow ventrally, blue-black dorsally, tarsi pale yellow. Mesothoracic leg with coxa white, femur blue-black, tibia blue-black except for white medial tuft and white tuft around spurs, tarsi mostly yellow-orange, blue-black dorsally. Metathoracic leg with coxa black basally, white apically, femur blue-black, tibia blue-black with much white in tufts around medial and apical spurs, tarsi yellow-orange with blue-black dorsally. Abdomen entirely blue-black dorsally, orange with white on posterior half ventrally, anal tuft orange except medio-basally. Male genitalia as in figure 5. Saccular ridge of valva very wide, nearly straight, edge lined with short, dark, simple scales. Wing length of male, 7-8 mm.

Female: Unknown.

Distribution (map 1): Present records from Alberta, Canada.

Type: Holotype: ♂, Waterton, Alberta, 10-VII-1923, H. Strickland, T.D.E. slide no. 76021, (USNM No. 72381), deposited in the USNM. One paratype: ♂, Banff, Alberta, 27-VII-1935, A. L. Melander, deposited in the collection of the University of California, Riverside.

Discussion: On the basis of the form of the saccular ridge, *S. canadensis* resembles those species considered by Engelhardt (1946) to be in the genus *Thamnosphecia* Spuler. In our current revisionary studies of the family Sesiidae, we treat *Thamnosphecia* as a synonym of *Synanthedon*.

S. canadensis is known only from the type series of 2 males, both only in fair condition. The species superficially resembles the female of *Synanthedon richardsi* (Engelhardt) from the eastern United States. The males of *S. richardsi* have orange on the anal tuft restricted to the base, and the antennae of both sexes of *S. richardsi* have pale yellow, when present, only near the apices. Additionally, the tibia of the

metathoracic leg of *S. richardsi* is mostly yellow, whereas in *S. canadensis* the tibia are blue-black ringed with white tufts. *Synanthedon fulvipes* (Harris) occurs in Alberta and also resembles *S. canadensis*; however, the orange anal tuft of *S. canadensis* easily distinguishes it from *S. fulvipes* and a few other species with which it might be confused.

Synanthedon dominicki n. sp.

fig. 1; map 1

Male: Antenna blue-black, spotted white near apex, clavate, tufted with scales apically and ciliate ventrally. Proboscis well developed. Labial palpus smoothly scaled, orange with brown-black apically and in narrow band dorsally. Head with vertex blue-black, front blue-black, occipital fringe orange. Thorax dorsally blue-black with subdorsal, longitudinal, orange stripe, orange ventrally. Forewing nearly $\frac{2}{3}$ hyaline with brown-black on costal margin, broad discal spot, strongly diffused in apical area, some yellow ventrally toward wing base. Hindwing hyaline except for brown-black on fringe and narrow discal spot. Legs mostly blue-black except for orange on epiphysis of prothoracic leg and some white on mesal surface of the tibiae and ventrally on tarsi. Abdomen blue-black except for some pale orange powdering ventrally on segments 4-7, anal tuft mostly orange-red except for blue-black on basal $\frac{1}{4}$ dorsally. Exposed portions of genitalia also orange-red with keel of orange-red scales ventrad. Male genitalia as in figure 1. Wing length of male, 8 mm.

Female: Unknown.

Host: Unknown.

Distribution (map 1): South Carolina.

Type: Holotype: ♂, Wedge Plantation, South Santee River, Charleston Co., S. C., March 27, 1967, Douglas C. Ferguson, T.D.E. slide no. 760S9, (USNM No. 72383), deposited in the USNM.

Discussion: This species is known only from the male holotype. We take pleasure in dedicating this species to Dr. Richard B. Dominick. It was on Dr. Dominick's plantation where his guest, Dr. Ferguson, collected the specimen at black light. More significantly, Dr. Dominick is contributing to the study of Lepidoptera as one of the prime movers behind the production of *The Moths of America North of Mexico*, for which series we are currently preparing the manuscript of the Sesiidae, Fascicle 5b.

Genus *Carmenta* Hy. Edwards

Carmenta engelhardti n. sp.

figs. 2, 7; map 1

Male: Antenna blue-black with apical scale tuft, clavate, ciliate ventrally. Proboscis well developed. Labial palpus smoothly scaled ventrally, white basally, brown-black dorsolaterally on apical half, pale yellow ventrally and mesally. Head with vertex blue-black, front gray-black with white laterally, occipital fringe dorsally pale yellow becoming white lateroventrally. Thorax dorsally blue-black

with subdorsal, narrow, longitudinal, yellow stripes, sublaterally with large patches of pale yellow. Wings mostly hyaline, blue-black on wing margins, veins, discal spot and apical area, slightly powdered with yellow on some veins, between veins in apical area and in small patch on distal margin of discal spot, yellow more extensive ventrad on wings. Wing fringe blue-black and tipped with white especially on hindwings. Prothoracic leg with coxa white and blue-black, femur blue-black laterally, white mesally, tibia black and white dorsally, pale yellow ventrally, tarsi white at joints and ventrally, black dorsally. Mesothoracic leg mostly blue-black with white mesally on femur and basal 1/2 of tibia, white band at tibial spurs, tarsi white ventrally and around joints. Metathoracic leg blue-black and white mesally on femur, banded white at tibial spurs, white ventrally and at joints on tarsi. Abdomen and anal tuft blue-black with weak, pale yellow bands on posterior margin of segments two and four. Male genitalia as in figure 2. The presence of a spine projecting from the ventral margin of the valva is a unique structure in the North American Sesiidae. Saccular ridge at its apex sharply recurved and continued to ventral margin of valva. Wing length of male, 8-9 mm.

Female: Antenna as for male but lacking ventral cilia. Maculation as for male, occasionally coxa of prothoracic leg slightly tinted with pale yellow on the white. Female genitalia as in figure 7. Ductus bursae somewhat atypical of *Carmenta* species in that it is very weakly sclerotized and expanded from origin of ductus seminalis to corpus bursae. Wing length of female, 8 mm.

Host: Unknown.

Distribution (map 1): Presently known from Arizona and New Mexico.

Types: Holotype: ♂, Garden Canyon, 5300 ft., Huachuca Mts., Cochise Co., Arizona, 14-VIII-1969, R. R. Snelling, T.D.E. slide no. 75975, deposited in the Los Angeles County Museum (Natural History), California. Two paratypes: 1 ♂, Skeleton Canyon, 5400 ft., Hidalgo Co., New Mexico, 12-VIII-1965, G. Ballmer, deposited in the collection of the University of California, Riverside; and 1 ♀, floor of Carr Canyon, 5400 ft., Huachuca Mts., Cochise Co., Arizona, 8-9.VIII.1952, H. B. Leech and J. W. Green, deposited in the California Academy of Natural Sciences, San Francisco.

Discussion: This species superficially resembles several species of *Carmenta* and *Synanthedon*, and an examination of the genitalia may be necessary for positive identification. The species is named for George P. Engelhardt, who devoted more than 40 years of his life to the study of the clearwing moths of North America.

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